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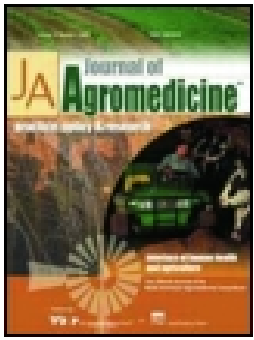
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"If We Don't Produce, Bring Another:" Work Organization and Tomato Worker Health

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ABSTRACT

Objectives: Specific work processes and management structures that contribute to high rates of occupational illness and injury in agricultural industries are not well described in academic literature. This qualitative study of work organization in the U.S. fresh tomato industry investigates how work processes and management structures impact tomato workers' occupational health.

Methods: After conducting literature review and key informant interviews, semi-structured interviews and focus groups were conducted with 36 individuals with experience working in the U.S. fresh tomato industry. Interviews and focus groups were audio-recorded, transcribed, coded, and analyzed using a modified grounded theory approach.

Results: These data indicate that participants endured income insecurity and hazardous supervisory practices, including wage theft, retaliation, intimidation, and humiliation, that put them at risk of preventable illness and injury. Support from workers' organizations and health-conscious supervisory practices helped mitigate some of these occupational hazards.

Conclusion: Participants' adverse work experiences may be considered sequelae of workers' lack of job control and positions of socioeconomic structural vulnerability. Other aspects of tomato work organization, including health-conscious supervisory practices and the involvement of workers' organizations, indicate that modifying work organization to better safeguard health is possible. Such modifications present compelling opportunities for employers, employees, organizations, community and government leaders, and health care professionals to help create healthier occupational environments for tomato workers.

KEYWORDS

Work organization; structural vulnerability; job demands control model; farmworker health; tomato production

Introduction

Agricultural work has one of the highest occupational illness and injury rates of U.S. industries, and occupational hazards intersect with the hazards of low socioeconomic status to manifest as markedly increased morbidity and mortality among farmworkers compared to the general population.^{1–4} However, the crop-specific work processes and management structures – what is referred to as “work organization” – that contribute to poor health outcomes have not been well described.⁵ This research responds to these gaps in the occupational and public health literature by investigating tomato workers' perspectives on work organization and its impacts on their health using qualitative methods.^{5–7} The U.S. fresh market tomato industry is an important setting to investigate work organization due to its

labor-intensive production methods, significant economic footprint, and leadership of workers' organizations.

Producing “fresh market” tomatoes, those destined for produce aisles and restaurant kitchens, currently requires exertion in extreme heat, prolonged stooping, heavy lifting, repetitive movements, and frequent applications of agricultural chemicals.^{8–13} A robust body of literature links these hazards with adverse health impacts.^{4,14–18} Workers produce fresh tomatoes in approximately 20 states, though 80% of total production happens in California and Florida.¹⁹ In 2014, an estimated 1.4 million people were employed as farmworkers in the United States; however, data on the number of workers employed to produce particular crops are lacking.²⁰ Farm employment is highest in the far

West and Southeast regions, comprising 40% and 21% of national agriculture and agricultural support services employment, respectively.²¹ Additionally, employment and demand for farmworker labor is growing in these regions, where tomatoes are a prominent labor-intensive crop.²¹ Valued at \$1.2 billion, fresh tomatoes were second to processing tomatoes in terms of production value of U.S. vegetables in 2015.²² They are second only to potatoes as the most consumed fresh market vegetable per capita in the United States.¹⁹ In the eastern United States, many tomato workers follow seasonal tomato harvests, traveling south to north among tomato farms in Florida, Georgia, North Carolina, Virginia, Tennessee, and Ohio.²³ Tomato work happens year-round in California, where most fresh tomatoes are grown in the San Joaquin Valley and Southern California.²⁴ In California and Florida, the industry is made up primarily of large companies with their own growing, packing, and shipping operations; whereas, in other states, such as Tennessee, companies are often smaller.^{14,24} The vast majority of U.S.-grown fresh tomatoes are field-grown, with a small but increasing contribution from greenhouse production.¹⁹

Many farmworkers remain formally excluded from laws and regulations meant to ensure occupational health and safety. This trend in labor policy is often known as “agricultural exceptionalism.”²⁵ Such lack of legal and regulatory health and safety protections is further compounded by poor enforcement of the policies that do apply and by immigration policies that discourage workers from challenging employer misconduct.^{25–28} The National Agricultural Workers’ Survey (NAWS) estimates that only 51% of farmworkers have work authorization, and 76% are immigrants to the United States.²⁹ Workers with H-2A visas, as “temporary guest workers,” are not included in NAWS, though they are being hired in increasing numbers nationwide, particularly in tomato-producing southeastern states.^{21,28–30} Although H-2A workers have more robust legal and safety protections than undocumented workers, they too fear retaliation and associated loss of future employment prospects for challenging employer misconduct, since their visa status is tied to a single employer and depends on the employer’s continued sponsorship.^{27,28,31} Haitian workers are another growing demographic within the agricultural workforce in

the Southeast.^{9,30} Very few Haitian workers arrive to the United States through the H-2A program, though over 58,000 Haitian immigrants to the United States have work authorization and protection from deportation through the “Temporary Protected Status” designation granted following the 2010 earthquake in Haiti.^{32,33} In a 2011 survey of Florida farmworker organizations, 40% reported serving Haitian workers.³⁰

Worker-led efforts within the fresh tomato industry are reforming aspects of workplace and market systems that contribute to occupational hazards. The United Farm Workers (UFW) helps secure labor contracts for tomato workers in California and campaigns for legislation extending farmworkers’ rights and occupational protections.^{34–36} The Farm Labor Organizing Committee is another union that advocates for policy change and negotiates contracts for workers in a number of agricultural industries, including tomatoes, in North Carolina, South Carolina, Ohio, and Mexico.^{36,37} The Coalition of Immokalee Workers (CIW), a human rights organization founded by tomato workers in southwest Florida, has secured wage increases and enhanced occupational health and safety protections, not through traditional union organizing, but through public campaigns aimed at large retail food companies that purchase millions of dollars of fresh tomatoes.^{9,38–40} As part of the CIW-affiliated “Fair Food Program,” corporate customers agree to purchase tomatoes from companies that adhere to a defined set of workplace standards, including zero tolerance for forced labor, sexual abuse, or other forms of violence; agreements regarding wages and payment practices; know-your-rights and safety trainings for workers and supervisors; and compliance with health and safety measures.⁹

This study investigated tomato workers’ perspectives on work organization using ethnographic, interview and focus group methods and conceptual frameworks from occupational health and the medical social sciences, with the aim of furthering farmworkers’ occupational health and safety.

Methods

This study collected data using interviews and focus groups. Data collection took place during the 2016 summer harvest season in southern and central

California and East Tennessee. Since Tennessee tomato workers are often based in Florida and work throughout the southern and eastern United States, this sampling strategy represented workers with experience working in multiple states, including states that lead tomato production – California and Florida. Human subjects research approval was obtained from the Committee for the Protection of Human Subjects, the Institutional Review Board of the University of California, Berkeley.

Key informant interviews

Before conducting data collection with tomato workers, the lead researcher conducted 14 informational interviews with individuals who had interacted extensively with tomato workers through community organizations such as medical clinics, legal aid organizations, and churches. Employers were not sought as key informants due to the imperative to safeguard farmworker participant rapport and confidentiality. Key informants oriented the lead researcher to the demographics, health concerns, and socioeconomic conditions of farmworkers in their region. This contextual information enriched data collection and analysis and facilitated research participant recruitment. This process corresponds to an ethnographic, community-based approach to qualitative research, which aims to situate data within a broader social context and build rapport with participants' communities over time.^{41,42}

Semi-structured interviews and focus groups

Eligible interview and focus group participants were ages 18–70; spoke English, Spanish, or Haitian Creole; and had worked in the fresh tomato industry for at least one season. Former tomato workers were included to account for the “healthy worker effect,” ensuring that disabled workers would not be systematically excluded from the sample. Specific country-of-origin and immigration status were not collected, since this may have posed an obstacle to recruitment and participation; gathering this information may have heightened the real or perceived risks of study participation, particularly since news of deportations and anti-immigrant sentiment were

widespread in the communities being recruited at the time. The researcher worked with five community organizations to recruit participants in two locations in California and five locations in Tennessee, with the goal of recruiting a sample representing a range of experiences of tomato work. Employers were not sought to assist with recruitment, since such a recruitment strategy may have exerted undue pressure to participate and/or may have dissuaded participants from fully expressing their opinions.

Interviews and focus groups were conducted in a semi-structured format. Question guides consisted of open-ended questions that prompted participants to describe how they performed their work, how their work impacted health, and what they would change, if anything, about their experience at work – a structure similar to the “WHACS” mnemonic (*What do you do? How do you do it? Are you concerned about any exposures? Coworkers or others exposed? Satisfied with your job?*) – developed for clinicians to take an occupational health history.⁴³ These questions directed participants to describe specific experiences, while ensuring openness to topics that could not be anticipated by preparatory research. The researchers chose this exploratory approach, which is classically employed by medical anthropologists, to collect richly descriptive data that can communicate the nuance and diversity of participants' experiences.⁴² This approach is especially useful when there is limited data on a topic, as is the case for tomato workers' perspectives on work organization.

The study included both focus groups and interviews to enrich data collection. Researchers anticipated that potential participants would have unpredictable work hours, unreliable means of communication and transportation, and possible reluctance to meet with a stranger to discuss potentially sensitive subjects. Focus groups addressed these challenges by enabling multiple people to participate during the same time frame alongside peers, which increased the study's sample size and added depth to the data, as participants responded to each other's perspectives. Participants in a focus group were recruited in the same location and spoke the same primary language.

Six one- or two-person interviews and four focus groups containing between four and nine participants were conducted. This was a sufficient sample to analyze common themes in detail and to generate further hypotheses for testing in future studies.⁴⁴ Interviews and focus groups lasted approximately one hour. Participants were compensated with supermarket gift cards. The lead researcher conducted one interview and one focus group with English to Haitian Creole interpretation by a bilingual community member. She conducted all other interviews and focus groups in Spanish. Except for one interview in which data were collected with written notes, all interviews and focus groups were audio-recorded. A professional transcription service transcribed Spanish audio files to text. The lead researcher transcribed English portions of data collected with Haitian Creole interpretation. Spanish-to-English translations were conducted by the lead researcher and a bilingual doctoral student.

Data analysis

Data were coded and analyzed using a modified grounded theory approach.⁴⁴ Grounded theory is an analytic approach used in medical anthropology, medical sociology, and qualitative public health that aims to derive theories and organizing concepts from qualitative data collected over extended time periods and across multiple sources. Researchers develop hypotheses based on interpretations of initial qualitative data, then test those hypotheses by collecting and analyzing more data in an iterative fashion. In this study, researchers assessed themes derived directly from the data and modified the classic analytic approach by forming hypotheses related to previously developed theories of work organization and structural vulnerability.

During data collection and analysis, the lead researcher discussed emerging themes, questions, and codes with the coauthors of this paper who are experts in the fields of immigrant and occupational health and social science research. Codes were assigned with Atlas.ti software (Atlas.ti, version 7.5.12, Berlin, Germany). Deductive codes included job tasks, hazards, injuries and illnesses, and occupational health concepts identified through literature review and key informant

interviews. Inductive codes were defined during the coding process, reflecting concepts that the researchers had not anticipated. A total of 147 codes were generated. The lead researcher then grouped codes into categories by type or theme of code and evaluated relationships between codes within and across transcripts. The researchers assessed coded data in relation to contextual information gained from both key informant interviews and literature review and evaluated how data fit within theoretical frameworks.

Results

A total of 36 individuals participated in this study. Participants in California worked in other California agricultural industries at the end of the tomato season. Most participants interviewed in Tennessee ($n = 17/25$) worked in other states' tomato harvests before or after the Tennessee season, most commonly in Florida. Nearly all workers who had experience with CIW workplace standards were interviewed in Tennessee, and all workers with UFW experience were interviewed in California. Additional participant and focus group characteristics are listed in Tables 1 and 2.

All Haitian Creole-speaking participants were recruited in Tennessee. Both Spanish- and Haitian Creole-speaking participants confirmed that workers who speak solely Haitian Creole face communication difficulties at work. Haitian Creole-speaking participants reported finding ways to communicate with hand gestures and with interpretation assistance by coworkers who

Table 1. Selected participant characteristics.

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Gender	<u>Women</u>	<u>Men</u>		
N =	16	20		
Language (of data collection)	<u>Spanish</u>	<u>Haitian Creole</u>		
N =	26	10		
Location (of data collection)	<u>East TN</u>	<u>Central and Southern</u> <u>CA</u>		
N =	25	11		
Tomato Industry Work Status	<u>Currently Employed</u>	<u>Formerly Employed</u>		
N =	28	8		
Usual Job Location	<u>Field</u>	<u>Packinghouse</u>	<u>Both</u>	
N =	26	2	8	
Years of experience	<u>1-5 years</u>	<u>5-10 years</u>	<u>≥10 years</u>	<u>Missing Data</u>
N =	13	8	11	3

Table 2. Selected focus group characteristics.

Focus Group	Location	Language	Number of participants
1	Central CA	Spanish	8
2	East TN	Spanish	4
3	East TN	Spanish	6
4	East TN	Haitian Creole with English interpretation	9

also spoke Spanish or English. Aside from these few important findings, this study did not detect significant differences between participants' work experiences by language group.

Results are presented as follows, arranged according to a conceptual framework of work organization and occupational health disparities developed for NIOSH, which includes three interacting levels of work organization: (1) job or task-specific factors, (2) employer or organizational factors, and (3) contextual factors affecting employment (e.g. social, political, and economic conditions).⁴⁵ Figure 1 depicts study findings and occupational health concepts at three interacting scales

of work organization, arranged in the nested manner of the well-known "ecological systems model" used in public health and the social sciences.⁴⁶

Task specific factors

Participants described a variety of tasks involved in fresh tomato production. Workers prepare fields for planting, plant seedlings, place stakes and twine, prune, pick tomatoes and collect them in buckets or boxes, transport containers to a collecting point in the fields and then to a packinghouse, sort tomatoes by size and quality, and pack tomatoes for transport to customers. Although the overall steps in this process were similar across locations, participants described variations in how jobs were done between different types of tomato, regions, and employers. For example, one participant in California explained that he had picked tomatoes into boxes atop

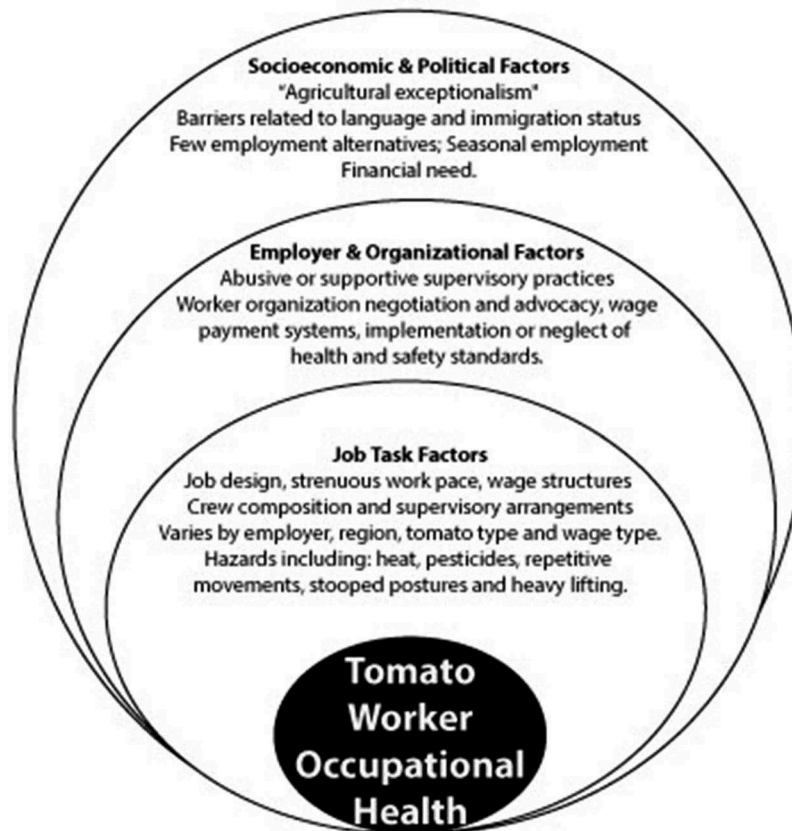


Figure 1. Depicts study findings and occupational health concepts at three interacting scales of work organization, arranged in the nested manner of the well-known "ecological systems model" used in public health and the social sciences.⁴⁶

a wheelbarrow-like cart; whereas, participants in another California region described using wire-handled buckets. Participants in Tennessee, many of whom had worked in multiple southeastern states, described picking into a single large bucket that they would hoist onto a shoulder and toss up to a coworker on a collection truck. More detailed descriptions of job tasks resulting from this study have been summarized in a guide for health care providers.¹⁰ Participants identified occupational health problems related to three common hazards: musculoskeletal hazards, agricultural chemicals, and hot weather conditions.

In every interview and focus group, musculoskeletal pains were among the most discussed topics. Collectively, participants named the upper and lower back, ribs, neck, shoulders, arms, wrists, hands, legs, knees, ankles, and feet as sites of pain. Participants attributed back pain to maintaining a stooped posture all day at work, and they attributed shoulder, arm, and hand pain to continuously carrying and lifting heavy buckets, as indicated in the following representative statements:

Being stooped over all day hurts you ... when it's time to get up, you get up with back pain. There are times when you say, "I think that I won't be able to pick right now."

-Current field worker, interview

We carry the bucket all day, and we're going to bring in the bucket [to the collection truck] and suddenly a cramp seizes us in the arm, and that's when we lose strength because it can give you a cramp in your hand just like that – it's strong.

-Current field worker, focus group

These participants alluded to the practice of continuing to work despite experiencing a significant amount of physical pain, a theme that surfaced in multiple interviews and focus groups. Participants did not identify any equipment or job rotation currently in use that helps to mitigate the risk of ergonomic hazards, beyond the occasional use of back braces purchased by and belonging to individual workers.

Participants also identified pesticide exposure as a common hazard. They reported that pesticide applications are frequent in fresh tomato production, ranging from nearly every week to every day, depending on location. They described a sense that

field workers are surrounded by chemicals, which can be found on the plants and in the irrigation water, the soil, and the dust stirred up while picking tomatoes. When discussing the danger of pesticides, some participants reported learning from safety video presentations at work. Several participants attributed itching or skin rashes to pesticides, while fewer participants expressed concern about pesticides causing cancer. Participants discussed protecting themselves from chemical exposures by staying out of recently pesticide-treated fields and wearing long-sleeved shirts, hats, closed-toed shoes, and occasionally gloves.

Participants also discussed the health effects of heat exposure and exertion in hot weather, including headaches, loss of appetite, nausea, muscle cramps, weakness, fatigue, dizziness, and fainting while working in the fields. The following excerpt describes some of these symptoms and links them to dehydration and lack of breaks:

We see people get dizzy and fall there [in the fields] ... Because with so much walking, it makes you really thirsty. Because of that sometimes people get sick, they get sick in the fields when [the heat] hits them, their head hurts, because [the supervisors] didn't give the people a chance to go and drink water.

-Former field worker, interview

Participants commonly explained that they had more difficulty taking breaks (to eat, use the bathroom, or rest) while doing certain job tasks than doing others. For example, they reported that packinghouse workers sorting tomatoes on a moving conveyer belt, pickers who needed to keep up with their crew, and collection truck workers responsible for emptying coworkers' full buckets often deferred breaks for fear of slowing down their coworkers and/or being criticized by supervisors.

Participants also described variation in work pace by wage type. They described multiple types of wage arrangements, which depended on the job task and agreements between employers and workers. For example, tomato picking was usually paid by piece (e.g., by the bucket), but sometimes could be hourly work. Other arrangements entailed working with a crew that does a predetermined amount of work (e.g., placing stakes in a section of field) for which the farm owner paid the labor contractor a lump sum, which the contractor would then divide among

workers. Most participants agreed that piece-rate wages created pressure to work quickly and continuously to maximize earnings. This pressure could encourage workers to forgo breaks or work at unsafe levels of exertion. Despite this, many participants preferred piece-rate work, because it allowed them the opportunity to potentially earn more money compared to hourly work. Participants in one focus group expressed a preference for piece-rate work, because it also allowed them to take breaks or leave work for the day without their supervisor pressuring them to return to work. They contrasted this to certain forms of hourly work in which supervisors would pressure employees to work as quickly and with as few breaks as possible. However, this scenario of hourly work was not always the norm, since several participants also explained that hourly work was typically “lighter” and less strenuously paced than piece-rate work. These varied pieces of data suggest that wage arrangement does not always correlate with work pace; workers may experience pressure to maintain strenuous work paces whether paid hourly or by piece, depending on influences of supervisory styles and the task being performed.

Employer-level risk factors

Participants described several harmful supervisory practices they had experienced while working in the tomato industry, including being prevented from attending to bodily needs as well as experiencing retaliation and wage theft. They explained that some supervisors pressured workers to forgo necessary breaks to rest, use the bathroom, drink water, or eat lunch in order to complete work as quickly as possible. The following excerpts exemplify the ways in which supervisors denied breaks and demanded a level of exertion that exceeded workers’ physical capacities.

Sometimes [supervisors] are very rude. They say vulgarities ... “Ay, why do you go shit so much? Can’t you hold it in?” Things like that.

-Former packinghouse worker, interview

If we can’t stand the heat anymore, because it’s above 100 degrees, many co-workers go to the shade. And the [bosses] say: “Get up! Get going!” and, well, the person can’t resist [the boss’s demands]. The supervisor tells the crew leader: “You know what? Don’t

bring me these people tomorrow.” So that’s what we encounter there in the fields ... They demand of us more than what we should do.

-Current field worker, focus group

Participants reported that workers who could not meet demands experience verbal harassment from supervisors, are docked pay, dismissed for the day, or permanently fired. They explained that they and their coworkers had endured conditions that were in violation of safety regulations, physically injurious, and/or personally humiliating for fear of losing their employment. The following excerpt exemplifies how some workers sought to avoid retaliation by enduring, rather than reporting, adverse working conditions:

Coworkers say that there is always discrimination there on the farms ... People don’t want to say so because they are afraid ... If the crew leader [mayordomo] finds out, they will lay them off later. And then they will fire them. There are times when people need the money, so they want to work. That’s why [the bosses] take advantage of them ... “I will endure,” they say ... That’s how I endured the fields. I endured until the last day, when finally, no. No more.

-Former field worker, interview

Participants also commonly experienced wage theft, describing how supervisors sometimes undercounted the number of buckets workers picked or the number of hours they worked. Several participants described the sense of being used for economic gain at the expense of their own well-being, explaining that supervisors demanded an unhealthy work pace and/or denied full payment of wages to earn more money for the company or earn favor from the company management. Several participants described such mistreatment in terms of dehumanization. They spoke of supervisors treating workers like objects or animals, as in these statements:

For the bosses, we are just like an object. Like a shovel. So, if the shovel breaks, throw it away, go and buy another one. For them we’re like that ... the bosses use us when we are young and strong – we have value. But when we don’t produce, well, bring another

-Current field worker, focus group

When we work in the hot season like this, there was only one place where we used to work that they would think to put out a tent ... We come to work – [we're] just there, like horses.

-Current field worker, focus group

Other participants made similar comparisons – one participant stating that their employer treated workers like “rags” and another like “machines”.

Employer-level protective factors

In addition to discussing hazardous practices, participants highlighted ways that some supervisors promoted healthier working environments. In both Tennessee and California, participants discussed at least one of the following practices: permitting necessary breaks, providing required water and shaded break areas, preventing entry into pesticide-treated fields, providing first aid or transport to medical assistance, showing safety videos, and correcting paychecks that were short. Some participants reported having half-hour lunch breaks and ten-minute afternoon breaks, although no participants described breaks as mandatory. Some participants explained that workers who were feeling ill could stop work for the day if they wished, and that they could take breaks as needed.

Several participants indicated that such health-conscious supervisory practices are more common than they were in the past and that working conditions have improved in recent years. Some participants attributed improved working conditions to the efforts of workers' organizations, specifically the UFW and the CIW.

Participants who were UFW members discussed several benefits of unionization, including the ability to negotiate the price per tomato bucket, the guarantee of a fixed employment period, more respectful treatment by managers, improved access to healthcare for occupational illness and injury, and increased employer accountability for workplace conditions. To describe the union's impact, several participants contrasted their current unionized workplace with previous nonunionized jobs, as in the following representative statement:

Since we have the union, we have protections. We have someone to support us, even more, we

understand our rights, right? ... [Employers] know we can bring a lawsuit. But with another company, the people don't know anything about their rights. Then because of that, they [employers] do what they want with the people.

-Current field worker, focus group

Participants who had benefited from CIW efforts also contrasted their employment with companies participating in CIW programs with those companies that did not participate. Several participants cited the punch card time-tracking systems that the CIW helped to implement as a major improvement in their working conditions and a notable difference between work in Florida and states where the CIW was not operating at the time, such as Tennessee. Such systems prevent hourly workers from being underpaid and allow workers to calculate whether piece-rate wages correspond to at least the hourly minimum wage, as these representative explanations demonstrate:

If you went placing twine and nothing else, well sometimes the minimum that you would make sometimes was \$30 all day. So people complained about that, and so the Coalition came in. They said, “If you're going to work and you're going to place twine and you don't make the minimum that you have to make, about \$63 per day, they [employers] have to pay you the minimum.”

-Current field worker, interview

In Florida, this [docking pay if a worker takes time to go to the bathroom] almost doesn't happen anymore, because the companies' systems changed – because now for example, when you start, they give you a card and they punch it for you, and there it tells you when you started, and it runs until you leave work in the afternoon. Before they did this, they cut back the time because they didn't give us a card to punch.

-Current field worker, focus group

Additionally, participants described how the CIW coordinated with workers and employers to define a full bucket as one in which the tomatoes are level with the bucket rim. Previously, many supervisors required workers to mound tomatoes above the rim, sometimes refusing to pay workers for buckets that they deemed insufficiently full. Participants discussed how they preferred the definition of a full bucket in effect in Florida to the

undefined standards in Tennessee. They also described how the CIW communicated with companies' management to advocate for workers' needs.

Socioeconomic factors

Participants described a prevailing need to earn money coupled with limitations on income and employment opportunities. Participants discussed how the need to support personal and family livelihood was the motivation for their work and the reason many workers endured hazardous working conditions. The following description exemplifies these common experiences:

You endure, a lot, a lot ... You have to do it, of course. Later you think, 'Ay, where am I going to get money to eat? Where am I going to get money to pay for the bus, for the bills, for the family?' It affects you a lot.

-Former field worker, focus group

Participants attributed some aspects of income insecurity to seasonal, weather-dependent work schedules. For example, in East Tennessee field-work would be postponed during and soon after heavy summer rains, which were not uncommon. In addition to this day-to-day uncertainty, they described the month-to-month instability of migrating every few months to a new harvest location with unknown work availability and expenses. When workers arrived at new workplaces and when they were brought to the fields well before a day's work would begin, participants explained that many workers had few alternatives to waiting without pay, as described in the following excerpt:

– It's because the boss wants to make sure that he has the people for when his harvest starts, but without thinking about how there isn't enough work to employ everyone.

– ... Sometimes the bosses take advantage, also. Because they say, "Well, [the workers] don't have anywhere to go, and they will put up with a lot."

-Former field workers, focus group

A majority of participants described the stress of living off limited savings or borrowed money during

such waiting times and during the off-season. Some explained that they would like to find more stable employment outside of agriculture, but were limited by lack of experience in other lines of work, English language skills, and/or work authorization.

Discussion

These data represent a diverse sample of 36 tomato workers' experiences of work organization in the large and heterogeneous fresh tomato industry. When viewing study data through the conceptual model of work organization and health disparities developed for NIOSH, it is apparent that the current system of tomato production includes hazardous exposures and worker vulnerabilities at each level of work organization.⁴⁵

At the task level, participants described musculoskeletal hazards including unassisted lifting and repetitive movements, heat hazards including high levels of exertion in hot climates with limited cooling breaks, and pesticide exposures. These hazards are well documented by farmworker occupational health literature;^{4,14–18} this study adds industry-specific qualitative details. Several symptoms that participants attributed to heat exposure are also known symptoms of pesticide exposure.¹⁸ Since workers do not have the means to measure the extent of their exposure and may not be aware of certain hazards, including heat and pesticide exposure measurements in future studies would be helpful. Task-level findings that merit further investigation by future studies are the health impacts of 1) different regional tomato production processes (e.g. with a handled or unhandled buckets; with buckets or with boxes atop carts; processes at larger compared to smaller companies) and 2) different types of wage structures in relation to work pace and job tasks. Numerous occupational health studies have correlated piece-rate wages with adverse health effects, including increased risk-taking and injuries and, in agricultural workers specifically, with acute kidney injury.^{47,48} In light of this evidence, some participants' preferences for piece-rate wages, due to higher perceived earning potential and ease of taking breaks in certain, perhaps limited, circumstances, raises concern. Under current systems of work organization, piece-rate workers pursue the

benefits of increased financial security and enhanced control over work pace at a high cost to their health.

At the employer and organization level, this study found that supervisory practices mediated tomato workers' exposures to occupational hazards by setting work pace, granting or denying breaks, permitting wage theft or ensuring full compensation, and relating to workers in a derogatory or in a dignified manner. Several participants attributed mistreatment to the prioritization of production and profit over workers' health. This finding correlates with previous studies in which farmworkers understood that supervisors were more interested in workers' productivity than their health or safety.^{49–52} Some participants in this study understood disregard for tomato workers' health to signify that employers saw workers as entities to be used for production, like tools or livestock, rather than as fully human beings meriting protection and care, which is consistent with other recent studies of agricultural working conditions and ethical critiques of contemporary agricultural labor systems.^{52–56}

This study and numerous others have confirmed that supervisors' misconduct harms farmworkers' wellbeing;^{51–53,57,58} this study contributes to the literature with the finding that the support of workers' organizations promotes supervisory practices notable for greater respect for tomato workers' just compensation, health, and dignity. With organizational support, workers in certain regions have a means to advocate collectively for fair wages and safer working conditions with less risk of employer retaliation. This is consistent with other studies on the influence of labor organizations on worker health, which have found positive associations between union participation and multiple measures of improved health and safety outcomes.^{59,60,61,62,63} There are few academic studies on the health impacts of farmworker labor organizations in particular,^{64,65} though this study's findings confirm reports of improved working conditions due to the efforts of farmworker organizations.^{9,34–40} Employer- and organization-level findings suggest a need to further characterize the experiences and interactions of tomato industry supervisors, employers, and workers' organization representatives; further study of these roles could help identify additional opportunities for employer-

and organization-level occupational health promotion.

With respect to the socioeconomic and political factors of work organization, this study supports the prevailing understanding that farmworkers' occupational health is profoundly shaped by financial insecurity, work authorization limitations, and immigration status. The majority of study participants reported that they and their coworkers had little choice but to endure hazardous working conditions in order to remain employed and provide for themselves and their families. They confirmed that tomato workers experience financial insecurity stemming from work organization factors at multiple levels, including seasonal and weather-dependent work hours, wage theft, employment insecurity exacerbated by the threat of employer retaliation, lack of economic opportunities in countries of origin, and lack of government-sanctioned work authorization in the United States.^{40,56–58,66–68} Though not discussed in depth in this study, discrimination based on citizenship and ethnicity is another known societal-level factor that prevents immigrant and ethnic minority farmworkers from securing safer and more stable employment.^{51–55,68,69} Thus, farmworkers not only lack control over their immediate working conditions, they also lack options regarding how they participate in the global labor market.

As this study and other studies have found, farmworkers confront numerous physical and psychological demands at work while lacking control over working conditions, and this lack of control manifests at each scale of work organization.^{45,49,51,53,70} Such strenuous work coupled with lack of control has been found to be a threat to health by occupational health and social science researchers alike. The *job demands-control model* proposes that elevated levels of psychological and physical demands and limited worker control over work processes and environments adversely impact workers' health; empiric studies have linked high demands and low control with detrimental health impacts in a number of industries, including agriculture.^{53,71–74} Similarly, the concept of *structural vulnerability* characterizes the degree of harm a person may suffer due to their relative position and power within social structures that “constrain decision making, frame choices, and limit life options”.⁷⁵ Empiric studies of workers in

hierarchical industries, whether berry pickers or government administrators, have demonstrated that workers who are more structurally vulnerable, e.g. those with low control over their life circumstances due to socioeconomic structures such as income or immigration status, sustain greater health harms than those who are less structurally vulnerable.^{53,67,76} All farmworkers in the United States are structurally vulnerable due to limited occupational and legal protections, and most experience additional structurally-produced vulnerabilities related to low incomes, limited educational opportunities, limited English proficiency, tenuous immigration status, and ethnic minority background.^{2,25–29,51–53,66–68}

Such structurally-produced vulnerability and associated lack of control, which, as this study attests, can manifest as constraints on fundamental bodily needs like using the bathroom or taking a cooling break, can be harmful and even deadly.^{4,14} In this study, participants described how workers' organizations have shifted tomato workers' social position and power within the U.S. fresh tomato industry. Such recourse against unfair, unsafe labor practices represents a health-protective increase in workers' control over their circumstances and a reduction of their structural vulnerability.

Limitations

Due to the nature and size of this qualitative, ethnographic study, we are unable to assess frequencies of adverse workplace experiences nor detect significant differences in the work experiences of the study's subgroups, e.g. between Haitian- and Spanish-speaking workers and between workers based in different regions of the United States. Findings of communication difficulties experienced by Haitian workers merit further investigation, particularly considering reports of Haitian farmworkers' experiences of discrimination.^{9,69} This study also raises questions about regional variation that were not fully explored but merit further research, including differences in tomato harvesting technique, workers' relationships to different worker organizations and employers, and workers' experiences of occupational health regulations in different states. Due to lack of language interpretation resources, individuals who speak exclusively indigenous Latin

American languages such as Mam or Mixteco were not included in the study. This is estimated to be a small population, since it is likely that many speakers of indigenous Latin American languages in the United States also speak Spanish. However, indigenous Latin Americans are a growing segment of workers in U.S. agriculture, and they represent distinct and important populations to include in future studies.^{51,77} A second language limitation was that only the English interpretations of data originally spoken in Haitian Creole were transcribed and analyzed. Additionally, the sample did not include workers with experience working as designated pesticide applicators nor workers with significant experience in greenhouse tomato production, which limited investigation of these aspects of fresh tomato production. Despite these limitations, the sample did include a range of perspectives that enabled a nuanced and representative description of this large, diverse industry, including women and men from a range of experience levels, language and cultural backgrounds, work locations, and work statuses.

Conclusion

The participants in this study described aspects of work organization in the U.S. fresh tomato industry that put them at risk for preventable illness and injury and wage theft, as well as experiences of humiliation and dehumanization. These adverse experiences may be considered sequelae of tomato workers' lack of job control and positions of structural vulnerability. Health-promoting aspects of tomato industry work organization, especially related to the leadership of workers' organizations and health-conscious employers, suggest that modifying work organization is a promising, possible, and effective approach to create healthier working conditions for tomato workers.

Recommendations

These findings inform the following recommendations for promoting tomato workers' health through work organization interventions. Interventions should be implemented at the level of job tasks, employer and organizational

practices, and socioeconomic conditions with the goals of increasing workers' control over their occupational safety and lessening their structural vulnerability in order to ultimately improve their health.

Fresh tomato industry stakeholders – particularly workers' organizations, employers, and occupational health professionals – should collaborate to empirically investigate and support implementation of administrative and engineering controls such as programmed rest breaks and load transfer devices that are known to reduce risk of musculoskeletal injuries; this is based on evidence that the current production system depends on hazardous stooped postures, heavy lifting, and repetitive movements.^{15–17} Since workers often contend with the pressures of piece-rate wages, fast work paces, and demanding supervisors, employers should proactively schedule preventive rest periods rather than scheduling rest only by worker request.

Stakeholders should collaborate to implement rest periods to mitigate heat-related illness, as well.¹⁴ Findings from this study support prioritizing cooling break interventions, since participants described strenuous exertion in hot weather conditions coupled with barriers to taking breaks to rest or drink water.

Industry stakeholders, especially employers, should seek expanded and on-going communication and collaboration with workers' organizations. Tomato consumers should support companies that participate in such collaborations. Workers should be guaranteed the right to participate in workers' organizations, and health care professionals interested in occupational health should look for ways to support their success. This is based on evidence that tomato workers benefit and occupational health is protected by the involvement of workers' organizations. The UFW contract farms and the CIW workplace standards are two exemplary models referenced by study participants.

Clinicians should screen for occupational hazards and structural vulnerabilities when taking farmworker patients' histories; promote patients' control over their occupational health by connecting them to “know your rights” trainings and workers' organizations in addition to standard health education materials; and help secure support for workers' organizations and multi-disciplinary occupational health improvement efforts, such as university-clinic partnerships.^{11,23,43,78,79}

Federal and state regulatory agencies should be equipped with the resources and interagency relationships necessary to enforce existing agricultural health and safety regulations to the full extent of the law. When empowered with appropriate resources, state occupational health and safety agencies should act within their mandate to promote farmworkers' occupational health by adopting state-specific regulations in addition to the minimum requirements set by federal regulatory requirements, e.g. California's Heat Illness Prevention Standard (California Labor Code §1140.2; 8 California Code of Regulations §3395).

Legislators should end “agricultural exceptionalism” by passing laws to ensure that all farmworkers have rights to the minimum wage, overtime pay, collective bargaining and union representation, and workplace safety standards equivalent to other hazardous industries.^{25,35,56,80}

Political leaders should pursue immigration reforms that ensure all agricultural workers' human rights, regardless of immigration status, are upheld.⁸¹ Such reforms should include robust mechanisms for immigrant workers to report or leave hazardous employment without risking loss of H-2A work authorization or deportation and a means for undocumented workers to gain work authorization, such as the “blue card” of the proposed Agricultural Worker Program Act bill.⁸² This is based on evidence from this study and others that demonstrate that farmworkers risk retaliation and subsequent loss of livelihood for asserting their rights, a risk that is magnified for temporary guest-workers and undocumented workers.

These work organization interventions could help remedy several root causes of tomato workers' occupational illnesses and injuries, thus reducing preventable and unjust suffering, morbidity, and mortality.

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